

of reports was also received from vessels in these waters that experienced moderate conditions. Storm logs.

American S. S. Balsam:

Gale began on the 25th, wind S. Lowest barometer 29.67 inches at 6 p. m. on the 25th, wind S., 10, in latitude 39° 24' N., longitude 64° W. End on the 26th, wind WSW. Highest force of wind 10, S.; shifts S.-SW.-WSW.

Dutch S. S. Burgerdijk:

Gale began on the 25th, wind WNW. Lowest barometer 29.91 inches at 2 a. m. on the 25th, wind WNW., 8, in latitude 43° 24' N., longitude 39° 49' W. End on the 26th, wind WNW. Highest force of wind 9; shifts WNW.-WSW.

At the time of observation on the 27th, moderate conditions were the rule over the ocean with the following exceptions. Latitude 40° N., longitude 50° W., wind NW., force 7, increased later in the day to SW., 9. Latitude 43° N., longitude 25° W., NW., 7. Latitude 46° N., longitude 36° W., W., 5; increased to NW., 8 at 10 p. m. on the 27th.

Charts VIII to XI cover the period from the 28th to 31st inclusive. Storm logs.

British S. S. Denham:

Gale began on the 28th, wind NW. Lowest barometer 29.38 inches at 2.30 a. m. on the 28th, wind NW., 9, in latitude 50° 33' N., longitude 42° 36' W. End on the 29th, wind WSW. Highest force of wind 9; shifts S.-SW.-WSW.

Belgian S. S. Elzasier:

Gale began on the 29th, wind S. Lowest barometer 29.73 inches on the 31st, wind SSW., in latitude 38° 14' N., longitude 47° 30' W. End on the 31st, wind SW. Highest force of wind 11; shifts S.-SW.

551.506 (265.2)
NORTH PACIFIC OCEAN

By WILLIS E. HURD

The weather of May, like that of the preceding month, was generally rather quiet over the North Pacific. Storms of marked severity were rare, and more trouble perhaps was experienced by vessels from the frequent cloudiness and fog than from any other meteorological source.

Fog showed a considerable increase in percentage over that of April, especially over the eastern half of the ocean where, in higher latitudes, the phenomenon was as frequent as to the westward of the 180th meridian. In both cases it occurred on approximately 50 per cent of the days. Fog was noted on several days along the American coast, particularly to the northward of the 30th parallel, and also reported on a few days along the China coast. Along the northern routes snow fell occasionally, and as late as the 23d the American S. S. *West Himrod* encountered snow squalls in latitude 46° 57' N., longitude 168° 14' E., temperature 36°, while on the 24th snow was reported a degree and a half farther south by the American S. S. *Las Vegas*.

In the Hawaiian region the weather was practically normal for the season, except that, as indicated by Honolulu, the rainfall was much less than average. The prevailing wind was east at Honolulu, and the maximum velocity was 31 miles from the east on the 14th.

Pressure distribution over the eastern part of the ocean, as shown by observations at the island stations, was without special significance. At Dutch Harbor the average pressure, based on p. m. observations, was 29.75 inches, or 0.08 inch below normal. The principal deficiency occurred during the period from the 19th to the 29th, inclusive. The highest pressure, 30.16, occurred on the 1st and 15th; the lowest, 29.06, on the 24th. At Midway Island the average pressure was 30.08 inches,

or 0.01 inch below normal. The highest reading, 30.26, was recorded on the 12th; the lowest, 29.82, on the 1st. At Honolulu the average, based on p. m. observations, was 30.05 inches, or normal. The highest reading, 30.12, was recorded on the 24th; the lowest, 29.95, on the 6th.

The great areas of high and low pressure—the North Pacific HIGH of western longitudes and the Aleutian LOW—were fairly well developed over the greater part of the month. Both areas fluctuated considerably. The center of the cyclonic disturbance, however, was more frequently east than west of Dutch Harbor, but on the 23d and 24th, the period of its greatest intensity, the center was south of the central Aleutians.

The HIGH was most seriously disturbed from the 12th to the 16th. During this period cyclonic conditions, central at about 45° N., 140° W., entered the area, pushed to the southward apparently by an anticyclone from Alaska. By the 14th the LOW had been forced to about 35° N., 145° W., where it remained until its disappearance on the 16th. The southward-moving anticyclone meanwhile covered the entire Gulf of Alaska and banked along the American coast to the 40th parallel from the 14th until the 17th. On the 18th low pressure again began moving in from the westward and the normal cyclonic and anticyclonic conditions were gradually restored.

In the Far East the continental HIGH disappeared with April, and a succession of LOWS was maintained in Chinese and Japanese waters throughout May. So far as our present data reveal, none of these lows were typhoons, and most if not all of them seem to have been of land origin. The strongest cyclones emanating from this region were those of the 19th–20th over southern Japan and of the 8th, 16th, and 23d to 27th over and to the eastward of northern Japan.

Ship observers reported only two days with gales to the westward of 130° east longitude. One was the 5th, when the American S. S. *Anna E. Morse* fell in with a northeast gale, force 8, pressure 29.80 inches, in 33° 54' N., 128° E. The other was the 20th, when the British S. S. *Bradford City* encountered a northwest gale, force 8, in 27° 09' N., 125° 30' E.

On the 6th to 11th gales occurred over scattered portions of the area bounded by the 40th and 50th parallels, meridian 175° W., and the Japanese coast. This stretch of ocean was the scene of a considerable barometric depression throughout the period. On the 8th the pressure at Nemuro was 29.18. The cyclone producing it advanced into the ocean on the 9th. The maximum wind force was 9, recorded by three vessels as follows:

7th.—British S. S. *Tamaha*, in 47° 50' N., 178° 39' W.
9th.—American S. S. *William Champion*, in 46° 07' N., 154° 32' E. The latter vessel also recorded at the same time the lowest corrected pressure, 28.60 inches, noted on the ocean for the month. 10th.—American S. S. *Anna E. Morse*, in 43° N., 149° 15' E., lowest pressure 28.89.

In west longitudes gales not exceeding 8 in force occurred over scattered localities on several dates.

On the 21st and 22d gales of force 8 were experienced by vessels in the neighborhood of 40° N., 150° E. On the 24th to 27th an active cyclone prevailed over and to the eastward of Japan. Reports indicate its greatest intensity to have been on the 24th, on which date the British S. S. *Bradford City* weathered a southerly gale of force 10, in 36° 56' N., 145° 07' E. On the 24th and 25th the British S. S. *La Crescenta*, while steaming along the Japanese east coast, hove to for some hours with

engines half speed in a severe easterly changing to northwesterly gale.

The most violent storm of the month was central south of the Aleutian Islands on the 23d and 24th. The American steamships *Dilworth* and *Las Vegas* encountered westerly gales of force 10 in 45° N., 166° to 170° E., lowest pressure about 29.10 inches, on the 23d. On the following day the cyclone intensified and the *Las Vegas* at local noon was in a west-northwesterly gale, force 11, accompanied by rain and snow, in 45° 20' N., 170° 30' E. Earlier on the 24th the Canadian S. S. *City of Vancouver* was nearer the center of the disturbance, eastward bound in a whole west gale, lowest pressure 28.73 inches, in 45° 44' N., 174° 46' E. This storm by the 25th had merged with the Aleutian Low and lost greatly in intensity.

No gales were reported from Mexican and Central American coast waters. Calms and light variable winds were frequent, but gentle northwesterly winds prevailed over most of the area.

CYCLONIC DISTURBANCES IN THE NORTH INDIAN OCEAN

By ALBERT J. MCCURDY, JR.

Weather reports received from vessels that traversed the shipping routes of this ocean in May, 1924, indicate
551.506 (73)

DETAILS OF THE WEATHER IN THE UNITED STATES

GENERAL CONDITIONS

ALFRED J. HENRY

The outstanding feature of the month was the depression in temperature in north-central and northeastern districts and the attendant cloudy, rainy weather which greatly retarded farming operations as noted elsewhere. The temperature distribution—low in the east and high in Pacific coast States—again illustrates the great contrasts that are occasionally experienced on opposite sides of the Rocky Mountains. The usual details follow.

CYCLONES AND ANTICYCLONES

By W. P. DAY

High-pressure areas during May were largely of the Alberta type, some of them moving south-southeast along the eastern slope of the Rockies in a manner not unlike the movement observed in these highs during the colder season.

Pressure was low over middle latitudes east of the Mississippi River from the 6th to the 14th, with several secondary disturbances developing within this area. The most important storms coming out of this area developed considerable intensity on the middle Atlantic coast on the 7th-8th and again on the 11th and 12th.

FREE-AIR SUMMARY

By V. E. JAKL, Meteorologist

The mean free-air temperature for the month was below normal over all aerological stations, the deficiency being much more pronounced over the northern stations than in the South. (See Table 1.) The departure was greatest over Ellendale, where the temperature averaged more than 4° C. below normal to the upper limit of observation, and least over Due West, where it was only a fraction of a degree colder than normal. This is substan-

tially in agreement with Chart III this REVIEW, which shows, for the region east of the Rocky Mountains, negative departures diminishing in general from north to south. The departures were generally quite uniform with altitude, indicating a similarity in source of supply of air at the different altitudes included in the observations. An exception is noted at Royal Center, where the departure increased decidedly with altitude.

The source of supply of air for the different altitudes at each station is well shown in the record of wind resultants for the month determined from kite observations (Table 2), and from the auxiliary record of pilot balloon observations, the resultants from the two classes of observations being in close agreement. There was a definite positive correlation between wind direction and temperature at all levels over Ellendale, Drexel, and Broken Arrow, where a subnormal temperature was associated with winds having a decidedly more northerly trend than usual for the month. Royal Center, to the east of these stations, showed resultant winds that were approximately normal in direction but abnormal in strength. At this station a marked deficiency in temperature occurred in connection with westerly winds that had a slight northerly component in the upper levels and a rather decided southerly component in the lower levels. It is apparent that in the upper levels over Royal Center the air was transported from regions to westward, where abnormally cold northerly winds prevailed. Moreover, the free-air records on the whole indicate what is suggested by the surface observations, viz, a general circulation of the air to at least a few thousand meters depth, from northwestern to eastern sections, in conformity with the average surface pressure gradient. (See Chart VI.) Over Groesbeck and Due West, where the temperature departures were slight, the wind resultants showed no important deviation from normal.

Relative humidities were on the whole somewhat below normal, which, coupled with the lower temperatures that prevailed, indicated a low water content of

that stormy conditions prevailed off the southern coast of India and in the vicinity of Ceylon and the Maldiv Islands in the middle decade of the month.

The Dutch S. S. *Yseldijk*, Capt. C. de Korver, proceeding from Rotterdam to Australia, on May 13, encountered a moderate southeasterly gale accompanied by squally weather and rain showers. Mr. D. Treep, observer, states that the lowest pressure observed was 30.03 inches (uncorrected), occurring at 6.03 p. m., in 16° 10' N., 89° 03' E. This gale lasted for two days and during that time the wind shifted from SE. to ESE.

On the 15th the American S. S. *West Mahomet*, Capt. H. Milde, Suez bound from Calcutta, ran into a moderate southwesterly gale accompanied by rough seas and overcast skies. Mr. Paul P. Zabeline, observer, reports that the lowest pressure observed was 29.70 inches, occurring at 6 p. m., in 9° 10' N., 83° E. The wind at this time was SSW., force 7.

The *West Mahomet* encountered its second gale of the month northwest of the Maldiv Islands on the 19th, reporting conditions similar to those experienced in the previous storm. The observer reports that at 5 p. m., while in 8° 20' N., 70° 30' E., the lowest pressure was recorded, being 29.75 inches. The wind at this time was W., force 7, and by 8 p. m., increased to a fresh gale.

Relative humidities were on the whole somewhat below normal, which, coupled with the lower temperatures that prevailed, indicated a low water content of